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Flood insurance study : Patrick County, VA 1990

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FLOOD INSURANCE STUDY

(2)

PATRICK COUNTY, VIRGINIA
(UNINCORPORATED AREAS)

(6)

REVISED:
MARCH 5, 1990

(5)

Federal Emergency Management Agency

(4) COMMUNITY NUMBER - 510252

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NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision (LOMR) process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Flood Insurance Study Effective Date: May 15, 1984

Flood Insurance Study Revised: March 5, 1990

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Exhibit 2 - Flood Boundary and Floodway Map Index
Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index
Flood Insurance Rate Map

FLOOD INSURANCE STUDY
PATRICK COUNTY, VIRGINIA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the unincorporated areas of Patrick County, Virginia, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in their efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses in this study represent a revision of the original analyses prepared by the Wilmington District of the U. S. Army Corps of Engineers (COE) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-E-0539, Project Order No. 5. The work for the original study was completed in September 1982. The hydrologic and hydraulic analyses for a portion of the South Mayo River in this revision were prepared by Dewberry & Davis using COE backup technical data. This work was completed in December 1988.

1.3 Coordination

The Virginia Water Control Board, county officials, and local residents were notified of the study and requested to furnish flood hazard data. Information was also requested from the Soil Conservation Service (SCS), the National Oceanic and Atmospheric Administration, the U. S. Geological Survey (USGS), and private contractors.

On March 18, 1981, community input was solicited and streams requiring detailed study were identified at an initial Consultation and Coordination Officer's (CCO) meeting attended by representatives of FEMA, Patrick County, and the COE (the study contractor). On June 21, 1983, the results of the original study were reviewed at a final CCO meeting held with representatives of FEMA, the county, and the COE.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the unincorporated areas of Patrick County, Virginia. The Town of Stuart is not included in this study. The area of study is shown on the Vicinity Map (Figure 1).

Portions of the South Mayo River, Campbell Branch, the North Fork South Mayo River, and Poorhouse Creek were studied by detailed methods. In this revision, the South Mayo River was revised from its original downstream limit of detailed study to the confluence of the North Fork South Mayo River, to incorporate updated hydrologic data. In addition, a COE flood reduction project, which includes channel improvements and a diversion channel, has been incorporated into the hydraulic analysis for the South Mayo River. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

All or portions of the following flooding sources were studied by approximate methods:

Johnson Creek	East Fork Johnson Creek
Birds Branch	Dan River
Rock Castle Creek	Little Creek
Poplar Camp Creek	Joint Crack Creek
Widgeon Creek	Little Widgeon Creek
Shooting Creek	Ararat River
Clarks Creek	Doe Run Creek
Owens Branch	Little Dan Creek
Hookers Creek	Poorhouse Creek
Smith River	Ivy Creek
South Mayo River	North Fork South Mayo River
Sycamore Creek	Little Sycamore Creek
North Fork	Buffalo Creek
Camp Creek	Puppy Creek
Goblintown Creek	Little Goblintown Creek
Hale Creek	Philpott Reservoir
Fairy Stone Lake	Archies Creek
Elk Creek	Sandy Creek

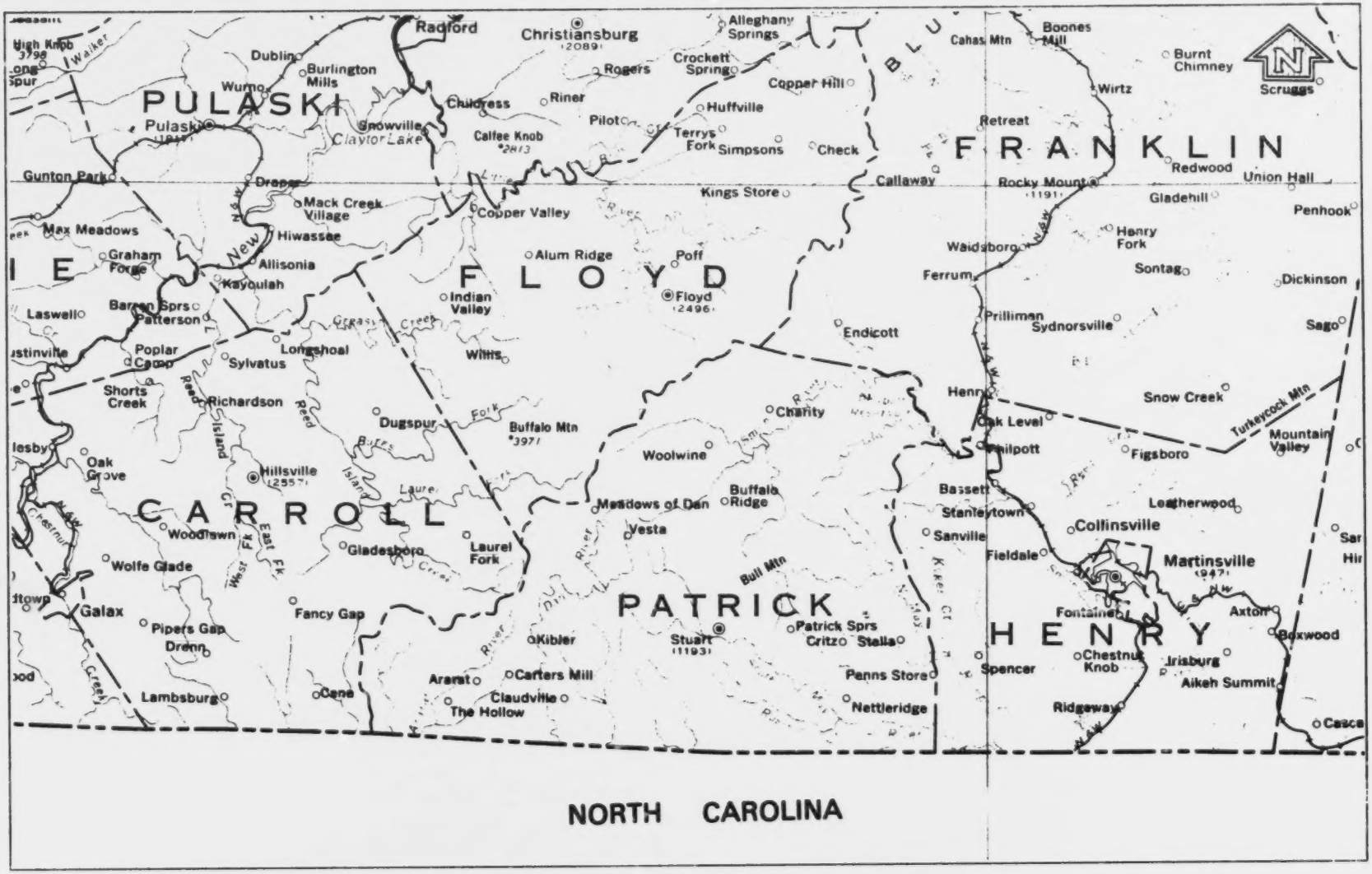


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA

(UNINCORPORATED AREAS)

APPROXIMATE SCALE

8 0 8 16 24 MILES

VICINITY MAP

Little Dan River	Ditch Creek
Peters Creek	Little Peters Creek
Rhody Creek	Rich Creek
Bull Mountain Fork	Anglin Branch
Laurel Branch	Blackberry Creek
Polebridge Creek	Spoon Creek
Russell Creek	Little Russell Creek
Grassy Branch	Spencer Creek
North Mayo River	Grays Fork
Mill Creek	Crooked Creek
Green Creek	Price Branch

Several unnamed tributaries within the county were also studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and Patrick County.

2.2 Community Description

Patrick County is located in the southwestern portion of Virginia, approximately 40 miles southwest of the City of Roanoke, Virginia, and 35 miles north of the City of Winston-Salem, North Carolina. It is bordered by the unincorporated areas of Carrol County to the west, the unincorporated areas of Floyd County to the northwest, the unincorporated areas of Franklin County to the northeast, the unincorporated areas of Henry County to the east, and the unincorporated areas of Surry and Stokes Counties, North Carolina to the south. The Virginia-North Carolina state line runs 30 miles along the southern boundary of the county. To the west, the Blue Ridge Parkway and county boundary meander along the eastern continental divide. Patrick County contains a total land area of 469 square miles and had a population of 17,498 in 1980 (Reference 1).

Patrick County was formed from Henry County in 1791. Both were named for the statesman, Patrick Henry. The county seat was established at Taylorsville, now known as Stuart. Farming formed the early base for the economy of the county but has now become secondary to manufacturing. The majority of manufacturing is centered in several large textile mills at Stuart and Woolwine, but lumber, particle board, and flooring are also important.

The headwaters of the South Mayo River, the Dan River, and the Smith River are located in Patrick County, just east of the continental divide. The South Mayo River rises in the mountains approximately 10 miles west of Stuart and flows southeast across the county. Campbell Branch originates 0.5 mile north of Stuart and flows south along the eastern corporate limits of the town. The North Fork South Mayo River and Poorhouse Creek begin 6 miles north of Stuart and flow south. The Dan River rises near Meadows of Dan, and the Smith River originates north of Stuart.

The topography of the study area is characterized by moderately steep terrain and small mountains. Included is the upper portion of the Piedmont physiographic province and the Blue Ridge Mountains. Land elevations vary from approximately 800 feet in the South Mayo River valley to approximately 3,000 feet at the highest point near the Blue Ridge Parkway.

The study area is underlain by Precambrain Age metamorphosed sedimentary rocks evident as schist and mica schist. A few miles east of Stuart is a body of hornblende gneiss which is a metamorphosed igneous intrusive body. There are six predominant types of soil found in Patrick County, including the Cecil, Madison, Cullen, Manor, Meyersville, and Stonyland. The Cullen, Manor, Meyersville, and Stonyland types are classified within the Hydrologic Soil Group C and have slow infiltration rates when thoroughly wet (Reference 2).

Temperatures average 39 degrees Fahrenheit (^{o}F) in January and 75^{o}F in July. The average annual precipitation in the county is 49 inches, with an average of 5.5 inches occurring in July and 2.9 inches in November (Reference 3).

There are several homes, businesses, and industries located within the floodplains of the study area. The South Mayo River floodplain includes many businesses in Stuart and a large textile mill in Patrick County. The Campbell Branch floodplain is very narrow but includes a school bus parking lot, a power substation, and a large lumber plant. Located within the North Fork South Mayo River and Poorhouse Creek floodplains are many homes and private bridges.

2.3 Principal Flood Problems

Low-lying areas of Patrick County are subject to periodic flooding from the South Mayo River, Campbell Branch, the North Fork South Mayo River, Poorhouse Creek, and several other streams. The most severe flooding on rivers results from heavy rains from tropical storms or major weather fronts, while creek flooding often results from intense local thunderstorms.

Significant floods occurred in the county in 1937, 1940, 1972, and 1979. The September 1979 flood is the largest of record at Stuart, with an estimated recurrence interval of approximately 110 years. Damage in the immediate area was estimated at $15 million, with approximately $11 million of the total in the unincorporated areas of Patrick County.

The August 1937 flood was described as the largest before the 1979 flood, but gage records, damage estimates, and high-water marks are not available. Newspaper accounts discuss damage to many businesses and industries in the study area. An account of the August 1940 flood describes it as 18 inches lower than the 1937 flood, with many businesses being damaged.

The June 1972 flood had a recurrence interval of approximately 10 years at Stuart, and damage was light. Campbell Branch was subject to lower magnitude flooding in April 1980, causing some industrial damage.

2.4 Flood Protection Measures

The COE has completed a channel improvement project for the South Mayo River in the vicinity of Stuart. This project, along with the South Mayo River Diversion, have considerably lessened flood hazards in and around Stuart. There are several dams located on the South Mayo River; however, these dams offer no protection from flooding.

There are no additional projects planned that will provide flood protection for Patrick County. Based on information contained in this Flood Insurance Study, floodplain regulations will be implemented by the county to preclude extensive flood damage to future development.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the county.

The USGS has operated a stream gage on the South Mayo River near Nettleridge since 1962. Discharges for the South Mayo River below the confluence of the North Fork South Mayo River were determined by a log-Pearson Type III analysis of nine gages in the Dan River basin, including the Nettleridge gage (Reference 4). In this

revision, this analysis has been updated to incorporate additional years of stream gage record that have elapsed since the original analysis. Peak discharge-frequency relationships for the South Mayo River Diversion were established through a divided flow analysis. A series of hydraulic analyses, using a range of discharges, was used to develop rating curves for the South Mayo River and the South Mayo River Diversion at their point of diversion. These two rating curves were combined; subsequently the three curves were compared to the flood-frequency discharges for the South Mayo River at the point of convergence with the diversion channel. The proportion of discharges flowing in the diversion and the South Mayo River was determined using the split flow option of the COE HEC-2 step-backwater computer program (Reference 5).

Peak discharge-frequency relationships for the South Mayo River above the confluence of North Fork South Mayo River, Campbell Branch, the North Fork South Mayo River, and Poorhouse Creek were based on a log-Pearson Type III regional study of 24 gages with lengths of record ranging from 17 to 58 years (Reference 6). These gages monitor drainage areas of 0.3 to 260 square miles in southwestern Virginia and northwestern North Carolina.

A summary of drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
SOUTH MAYO RIVER					
At State Route 8	32.7	4,100	9,200	12,600	24,700
Above the confluence of North Fork South Mayo River	14.4	2,400	4,470	5,660	9,340
Below the confluence of Brushy Fork	11.5	2,070	3,840	4,860	8,010
Above the confluence of Brushy Fork	9.6	1,830	3,390	4,280	7,060
Above the confluence of Rye Cove Creek	5.2	1,210	2,240	2,820	4,650
At State Route 644 at Dobyns	3.3	880	1,630	2,060	3,380
CAMPBELL BRANCH					
At its confluence with the South Mayo River	1.4	490	900	1,130	1,850
At State Route 681	1.1	420	770	970	1,590
At U. S. Route 58	0.6	280	520	650	1,070

TABLE 1 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
NORTH FORK SOUTH MAYO RIVER					
At its confluence with the South Mayo River	17.7	2,770	5,150	6,520	10,770
Above the confluence of Poorhouse Creek	10.4	1,930	3,580	4,530	7,460
Below the confluence of Bull Mountain Fork	8.0	1,620	3,000	3,790	6,250
At U. S. Route 58	5.1	1,180	2,190	2,770	4,550
POORHOUSE CREEK					
At its confluence with the North Fork South Mayo River	7.0	1,470	2,720	3,430	5,650
At State Route 642	6.3	1,360	2,530	3,190	5,250
SOUTH MAYO RIVER DIVERSION					
At convergence with the South Mayo River	*	2,900	6,900	9,350	17,700

*Data not available

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross-section data for the streams studied by detailed methods were obtained from field surveys and topographic maps compiled from aerial photographs (Reference 7). All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 5). Starting water-surface elevations for the South Mayo River were obtained from a COE Flood Plain Information report (Reference 8). Starting water-surface elevations for Campbell Branch, the North Fork South Mayo River, and Poorhouse Creek were determined by the slope/area method. Starting water-surface elevations for the South Mayo River Diversion were taken

from the South Mayo River at the confluence of the diversion. Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

Channel roughness coefficients (Manning's "n") used in the hydraulic computations were determined by field inspection and topographic maps compiled from aerial photographs (Reference 7). The channel "n" values for the South Mayo River ranged from 0.045 to 0.050, and the overbank "n" values ranged from 0.100 to 0.120. The channel "n" values for Campbell Branch ranged from 0.070 to 0.080, and the overbank "n" values ranged from 0.090 to 0.180. For the North Fork South Mayo River, the channel "n" value was 0.050, and the overbank "n" value was 0.120. The channel "n" value for Poorhouse Creek was 0.070, and the overbank "n" values ranged from 0.100 to 0.150. For the South Mayo River Diversion, the channel "n" value was 0.095, and the overbank "n" value was 0.100.

All elevations used in this study are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in the study are shown on the maps.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

The approximate 100-year flood boundaries for the South Mayo River were taken from a COE Flood Plain Information report (Reference 8). For the remaining streams studied by approximate methods, the extent of the 100-year flood was estimated using a USGS technique and stages on similar streams studied by detailed methods (Reference 9).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study produces maps designed to assist communities in developing floodplain management measures.

4.1 Flood Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps (Reference 7).

For the South Mayo River, the boundary of the 100-year floodplain was delineated using a COE Flood Plain Information report (Reference 8). For the remaining streams studied by approximate methods, the boundary of the 100-year flood was delineated using USGS topographic maps and the Flood Hazard Boundary Map for Patrick County (References 10 and 11).

In this revision, the boundaries of the 100-year floodplain for the South Mayo River flood protection project were delineated using project "as-builts" provided by the COE (Reference 12).

The 100- and 500-year floodplain boundaries are shown on the Flood Boundary and Floodway Map (Exhibit 2). In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as a minimum standard that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the floodplain. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were determined at cross sections. Between cross sections, the boundaries were interpolated. In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary has been shown. Portions of the floodway widths for the South Mayo River, Campbell Branch, and the North Fork South Mayo River extend beyond the county boundary.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
South Mayo River								
A	152,900	180	1,495	8.4	1,152.8	1,152.8	1,153.3	0.5
B	155,200	200	1,686	7.5	1,163.1	1,163.1	1,163.4	0.3
C	156,000	232	2,168	5.8	1,166.9	1,166.9	1,166.9	0.0
D	156,300	210	1,812	7.0	1,167.5	1,167.5	1,167.7	0.2
E	156,657	350	2,781	4.5	1,169.9	1,169.9	1,170.5	0.6
F	157,190	465	3,877	3.2	1,171.1	1,171.1	1,172.0	0.9
G	158,120	250	1,832	6.9	1,172.1	1,172.1	1,172.8	0.7
H	158,220	181	1,444	8.7	1,172.3	1,172.3	1,173.0	0.7
I	158,430	176	1,500	8.4	1,172.7	1,172.7	1,173.7	1.0
J	158,740	180	1,644	7.7	1,173.6	1,173.6	1,174.6	1.0
K	159,360	157	1,373	9.2	1,174.9	1,174.9	1,175.3	0.4
L	159,820	75	530	6.1	1,175.0	1,175.0	1,175.4	0.4
M	160,400	53/30[2]	354	9.2	1,176.1	1,176.1	1,176.4	0.3
N	161,084	77/40[2]	463	7.0	1,179.0	1,179.0	1,179.1	0.1
O	161,650	45/27[2]	306	10.6	1,181.8	1,181.8	1,181.9	0.1
P	162,401	100/65[2]	799	15.8	1,187.2	1,187.2	1,187.2	0.0
Q	162,480	115/60[2]	1,016	12.4	1,189.5	1,189.5	1,189.7	0.2
R	162,830	107/45[2]	1,073	11.7	1,193.0	1,193.0	1,193.0	0.0
S	163,000	75	863	14.6	1,193.7	1,193.7	1,193.7	0.0
T	163,500	108	1,413	8.9	1,197.6	1,197.6	1,198.0	0.4
U	163,700	154	2,973	4.2	1,206.2	1,206.2	1,207.1	0.9
V	163,850	171	2,166	5.8	1,206.2	1,206.2	1,206.9	0.7
W	164,060	323	4,065	3.1	1,206.9	1,206.9	1,207.7	0.8
X	164,190	237	2,908	4.3	1,206.9	1,206.9	1,207.7	0.8
Y	164,330	249	2,701	4.7	1,207.1	1,207.1	1,207.9	0.8
Z	164,780	331	3,266	3.9	1,208.3	1,208.3	1,209.1	0.8

[1]Feet above confluence with Mayo River
[2]Width/width within corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

FLOODWAY DATA

SOUTH MAYO RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
South Mayo River (continued)								
AA	165,190	230	2,332	5.4	1,209.1	1,209.1	1,209.8	0.7
AB	166,840	252	2,561	4.9	1,214.1	1,214.1	1,215.0	0.9
AC	168,220	180	1,120	5.1	1,217.6	1,217.6	1,218.0	0.4
AD	168,820	140	806	7.0	1,221.2	1,221.2	1,221.7	0.5
AE	169,600	95	667	8.5	1,227.1	1,227.1	1,227.7	0.6
AF	170,730	150	836	6.8	1,235.0	1,235.0	1,235.0	0.0
AG	171,630	160	892	6.3	1,241.5	1,241.5	1,241.6	0.1
AH	172,875	90	677	8.4	1,253.6	1,253.6	1,253.6	0.0
AI	173,480	110	1,036	5.5	1,259.7	1,259.7	1,260.2	0.5
AJ	173,930	200	1,084	5.2	1,262.2	1,262.2	1,262.4	0.2
AK	175,180	150	798	7.1	1,268.8	1,268.8	1,269.0	0.2
AL	176,350	50	483	11.7	1,280.8	1,280.8	1,281.2	0.4
AM	177,380	80	616	9.2	1,289.5	1,289.5	1,289.6	0.1
AN	178,260	190	948	6.0	1,294.4	1,294.4	1,295.2	0.8
AO	179,180	150	945	6.0	1,301.6	1,301.6	1,302.3	0.7
AP	180,230	80	589	9.6	1,317.1	1,317.1	1,317.1	0.0
AQ	181,150	180	1,054	5.4	1,326.0	1,326.0	1,326.6	0.6
AR	181,960	150	1,125	5.0	1,333.7	1,333.7	1,333.8	0.1
AS	182,940	90	516	9.4	1,341.6	1,341.6	1,341.7	0.1
AT	183,360	150	1,115	3.8	1,346.5	1,346.5	1,346.9	0.4
AU	184,610	240	1,773	2.4	1,359.2	1,359.2	1,359.6	0.4
AV	185,340	80	444	9.6	1,363.8	1,363.8	1,364.6	0.8
AW	186,520	100	352	8.0	1,372.8	1,372.8	1,372.8	0.0
AX	189,030	150	555	5.1	1,399.3	1,399.3	1,399.3	0.0
AY	189,590	80	352	8.0	1,406.7	1,406.7	1,406.9	0.2

[1]Feet above confluence with Mayo River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

FLOODWAY DATA

SOUTH MAYO RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
South Mayo River (continued)								
AZ	191,460[1]	130	374	7.4	1,432.6	1,432.6	1,432.6	0.0
BA	192,600[1]	140	408	6.9	1,449.3	1,449.3	1,449.3	0.0
BB	193,420[1]	100	381	7.4	1,462.9	1,462.9	1,462.9	0.0
BC	194,510[1]	130	540	3.8	1,480.6	1,480.6	1,481.5	0.9
BD	194,780[1]	95	491	4.2	1,485.1	1,485.1	1,485.3	0.2
Campbell Branch								
A	230[2]	110/30[3]	247	4.6	1,178.9	1,178.9	1,179.1	0.2
B	850[2]	200/15[3]	588	1.7	1,188.0	1,188.0	1,188.3	0.3
C	1,410[2]	34/10[3]	118	8.4	1,198.8	1,198.8	1,199.1	0.3
D	1,580[2]	35/10[3]	161	6.1	1,204.6	1,204.6	1,204.8	0.2
E	2,710[2]	35/15[3]	152	6.5	1,231.1	1,231.1	1,231.2	0.1
F	3,350[2]	24/17[3]	90	10.1	1,245.7	1,245.7	1,245.7	0.0
G	3,510[2]	35/12[3]	115	7.9	1,250.1	1,250.1	1,250.1	0.0
H	3,710[2]	50/13[3]	210	3.1	1,253.9	1,253.9	1,254.4	0.5

[1]Feet above confluence with Mayo River
[2]Feet above confluence with South Mayo River
[3]Width/width within corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

FLOODWAY DATA

SOUTH MAYO RIVER - CAMPBELL BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY	INCREASE
Campbell Branch (continued)								
I	4,000	50/41[2]	255	2.1	1,261.4	1,261.4	1,261.7	0.3
J	5,010	30/17[2]	94	5.7	1,292.3	1,292.3	1,293.0	0.7
K	5,560	30/13[2]	108	4.9	1,305.5	1,305.5	1,306.0	0.5
L	6,060	30/15[2]	94	5.6	1,316.3	1,316.3	1,316.9	0.6
M	6,340	30/14[2]	125	3.8	1,325.3	1,325.3	1,325.5	0.2
N	6,440	30/8[2]	93	5.2	1,326.6	1,326.6	1,327.3	0.7
O	7,210	60/53[2]	133	3.6	1,348.4	1,348.4	1,348.8	0.4
North Fork South Mayo River								
A	950	170	1,016	6.4	1,216.8	1,216.1[3]	1,216.4	0.3
B	1,230	230	1,543	4.2	1,218.3	1,218.3	1,218.7	0.4
C	1,750	105	669	9.7	1,220.0	1,220.0	1,220.6	0.6
D	2,830	110/35[2]	1,213	5.4	1,228.7	1,228.7	1,228.8	0.1
E	3,330	120/67[2]	1,348	4.8	1,232.6	1,232.6	1,233.6	1.0
F	4,100	150/61[2]	1,108	5.9	1,234.9	1,234.9	1,235.8	0.9
G	5,270	100/40[2]	836	7.7	1,242.7	1,242.7	1,242.8	0.1
H	5,740	100	661	6.9	1,245.0	1,245.0	1,245.3	0.3
I	6,510	100	559	8.1	1,250.3	1,250.3	1,250.4	0.1
J	7,810	70	541	8.4	1,263.8	1,263.8	1,264.1	0.3
K	8,330	70	476	9.5	1,267.3	1,267.3	1,267.4	0.1

[1]Feet above confluence with South Mayo River

[2]Width/width within corporate limits

[3]Elevation computed without consideration of backwater effects from South Mayo River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

FLOODWAY DATA

CAMPBELL BRANCH AND NORTH FORK SOUTH MAYO RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
North Fork South Mayo River (continued)								
L	8,930	160	841	5.4	1,275.5	1,275.5	1,275.5	0.0
M	9,880	250	1,018	4.5	1,281.3	1,281.3	1,281.4	0.1
N	10,190	210	1,039	4.4	1,283.2	1,283.2	1,283.4	0.2
O	10,930	210	978	4.6	1,288.4	1,288.4	1,288.4	0.0
P	11,830	80	549	8.3	1,294.1	1,294.1	1,294.6	0.5
Q	12,640	100	616	7.4	1,304.2	1,304.2	1,304.6	0.4
R	13,150	65	492	9.2	1,307.5	1,307.5	1,307.6	0.1
S	14,130	180	788	5.8	1,323.2	1,323.2	1,323.3	0.1
T	14,680	120	836	5.4	1,326.0	1,326.0	1,326.7	0.7
U	15,730	65	736	6.2	1,349.6	1,349.6	1,349.7	0.1
V	16,250	70	700	6.5	1,351.2	1,351.2	1,351.6	0.4
W	16,790	70	808	5.6	1,353.1	1,353.1	1,353.7	0.6
X	18,630	70	642	7.1	1,367.4	1,367.4	1,368.4	1.0
Y	20,640	100	729	5.2	1,381.3	1,381.3	1,381.4	0.1
Z	21,150	100	794	3.5	1,387.5	1,387.5	1,388.1	0.6
AA	21,380	60	529	5.2	1,390.7	1,390.7	1,391.3	0.6

[1]Feet above confluence with South Mayo River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

FLOODWAY DATA

NORTH FORK SOUTH MAYO RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Poorhouse Creek								
A	100	90	606	5.7	1,244.0	1,242.6[2]	1,243.3	0.7
B	980	90	506	6.8	1,252.6	1,252.6	1,252.7	0.1
C	1,100	90	694	4.9	1,254.4	1,254.4	1,255.1	0.7
D	1,700	90	448	7.7	1,259.7	1,259.7	1,260.0	0.3
E	1,940	90	423	8.1	1,263.0	1,263.0	1,263.2	0.2
F	2,100	90	685	5.0	1,266.1	1,266.1	1,266.8	0.7
G	2,310	90	735	4.7	1,268.8	1,268.8	1,269.7	0.9
H	3,000	70	497	6.7	1,274.6	1,274.6	1,274.8	0.2
I	3,200	60	480	7.0	1,278.6	1,278.6	1,278.8	0.2
J	3,600	45	304	10.8	1,287.0	1,287.0	1,287.0	0.0
K	4,600	110	903	3.6	1,309.0	1,309.0	1,309.1	0.1
L	5,100	150	684	4.8	1,311.4	1,311.4	1,312.1	0.7
M	5,600	100	506	6.3	1,318.9	1,318.9	1,319.3	0.4
N	5,840	100	685	4.7	1,323.9	1,323.9	1,324.6	0.7

[1]Feet above confluence with North Fork South Mayo River

[2]Elevation computed without consideration of backwater effects from North Fork South Mayo River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

FLOODWAY DATA

POORHOUSE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
South Mayo River Diversion								
A	265	*	1,037	9.0	1,175.2	1,175.2	1,175.5	0.3
B	875	*	910	10.9	1,177.3	1,177.3	1,177.5	0.2
C	1,368	*	903	10.4	1,179.8	1,179.8	1,179.8	0.0
D	1,815	*	887	10.5	1,181.9	1,181.9	1,181.9	0.0

[1]Feet above convergence with South Mayo River
*Floodway coincident with channel banks

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

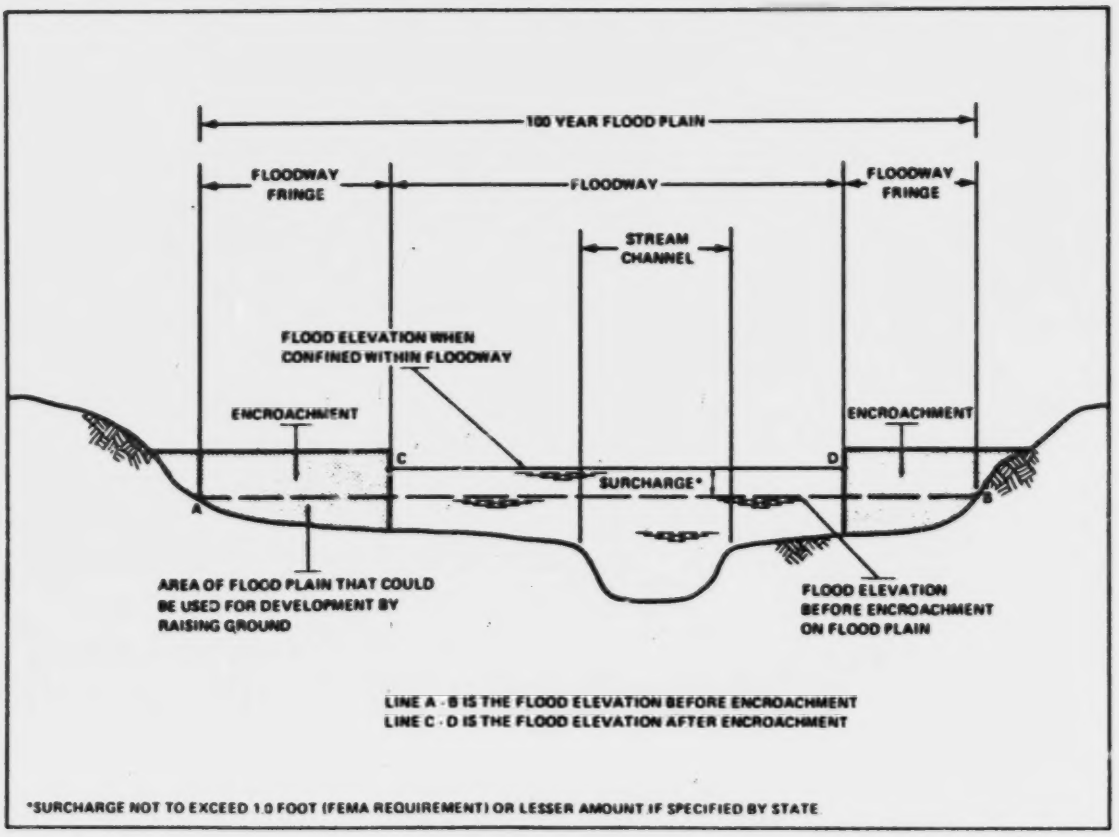
PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

FLOODWAY DATA

SOUTH MAYO RIVER DIVERSION

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe thus encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 2 for certain downstream cross sections of the North Fork South Mayo River, and Poorhouse Creek are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FLOODWAY SCHEMATIC

Figure 2

5.0 INSURANCE APPLICATION

To establish actuarial insurance rates, data from the engineering study must be transformed into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail in the unincorporated areas of Patrick County.

5.1 Reach Determinations

Reaches are defined as sections of floodplain that have relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference may not have a variation greater than that indicated in the following tabulation for more than 20 percent of the reach:

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the flooding sources of the unincorporated areas of Patrick County are shown on the Flood Profiles (Exhibit 1) and summarized in Table 3.

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is used to establish relationships between depth and frequency of flooding in any reach. This relationship is then used with depth-damage relationships for various classes of structures to establish actuarial insurance rate tables.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations rounded to the nearest one- half foot, multiplied by 10, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, it is rounded to the nearest whole foot.

5.3 Flood Insurance Zones

Flood insurance zones and zone numbers are assigned based on the type of flood hazard and the FHF, respectively. A unique zone number is associated with each possible FHF, and varies from 1 for a FHF of 005 to a maximum of 30 for a FHF of 200 or greater.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
South Mayo River							
Reach 1	84	-4.9	-1.5	+4.22	050	A10	Varies
Reach 2	84	-4.0	-1.3	+3.62	040	A8	Varies
Reach 3	84	-5.1	-1.8	+5.14	050	A10	Varies
Reach 4	81,82,84	-2.9	-0.9	+2.3	030	A6	Varies
Campbell Branch							
Reach 1	84	-1.6	-0.5	+1.3	015	A3	Varies
Reach 2	84	-1.0	-0.3	+0.7	010	A2	Varies
North Fork South Mayo River							
Reach 1	82,84	-3.6	-1.1	+2.7	035	A7	Varies
Poorhouse Creek							
Reach 1	82	-2.6	-0.8	+2.0	025	A5	Varies
South Mayo River Diversion							
Reach 1	84	-3.7	-1.4	3.5	035	A7	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

FLOOD INSURANCE ZONE DATA

SOUTH MAYO RIVER - CAMPBELL BRANCH - NORTH FORK MAYO RIVER - POORHOUSE CREEK - SOUTH MAYO RIVER DIVERSION

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zones A2, A3, A5, A6, A7, A8, and A10:	Special Flood Hazard Areas inundated by the 100-year flood; with base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Areas and the limits of the 500-year flood; areas that are protected from the 100- or 500-year floods by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding; not subdivided.

Flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding sources studied in detail in the community are shown in Table 3.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the unincorporated areas of Patrick County is, for insurance purposes, the principal result of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevations. Base flood elevation lines show the locations of the expected whole-foot water-surface elevation of the base (100-year) flood. The base flood elevations and zone numbers are used by insurance agents, in conjunction with structure elevations and characteristics, to assign actuarial insurance rates to structures and contents insured under the National Flood Insurance Program.

6.0 OTHER STUDIES

In April 1975, the COE published a Flood Plain Information report on the South Mayo River and the North Fork Mayo River (Reference 8). Flood profiles for the South Mayo River in this study are 1 to 4 feet higher than those in the COE report due to better definition of non-effective flow areas. Profiles for the North Fork South Mayo River in this study are approximately 1 foot lower due to refinements in hydrologic data, which resulted in lower discharges.

Flood Insurance Studies have been prepared for the unincorporated areas of Henry and Franklin Counties, Virginia, and the unincorporated areas of Surry County, North Carolina (References 13, 14, and 15). Blackberry Creek was studied by detailed methods in the Henry County study and by

approximate methods in this study, while it was not studied in the Franklin County study. The Ararat River was included in the detailed study streams of Surry County, but it is studied by approximate methods in this study.

A Flood Insurance Study has been prepared for the Town of Stuart (Reference 16). The results of this study are in exact agreement with the results of that study.

Due to its more up-to-date nature, this study supersedes the previously published Flood Insurance Study for the unincorporated areas of Patrick County (Reference 17).

7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, Liberty Square Building (Second Floor), 105 South Seventh Street, Philadelphia, Pennsylvania 19106.

8.0 BIBLIOGRAPHY AND REFERENCES

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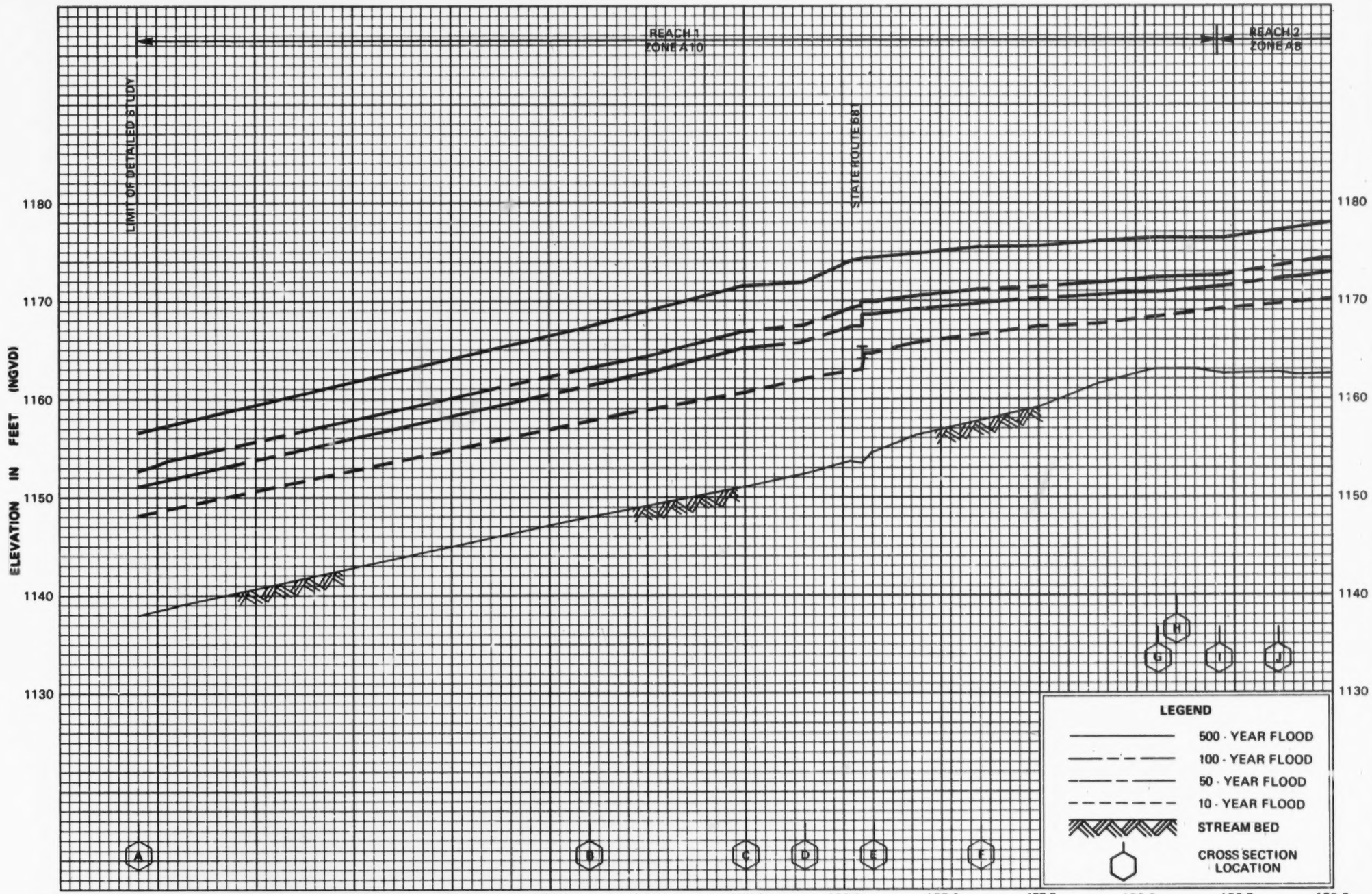


FLOOD PROFILES

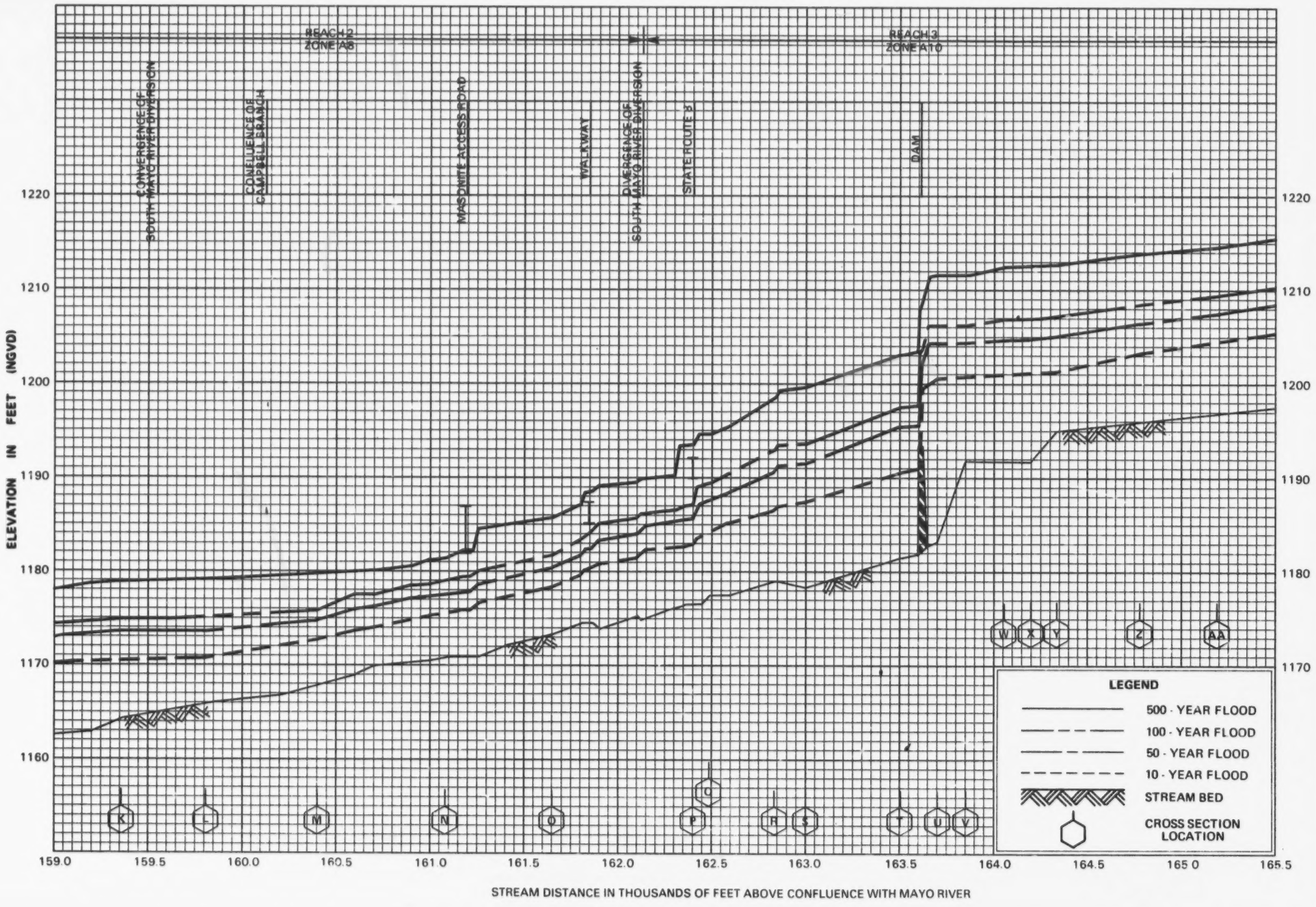
SOUTH MAYO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA

(UNINCORPORATED AREAS)

01P



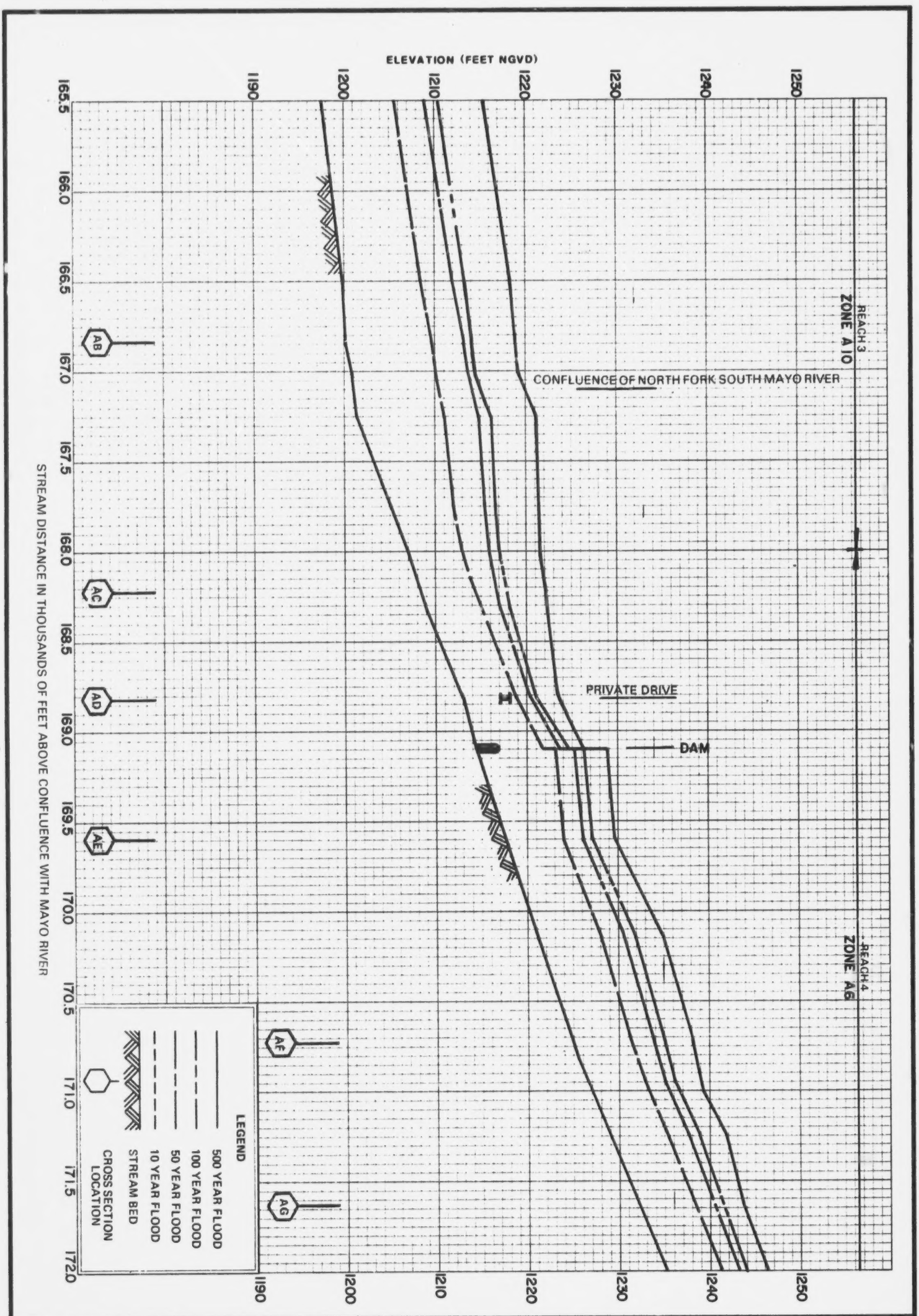
FLOOD PROFILES

SOUTH MAYO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

02P



FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY VA.
(UNINCORPORATED AREAS)

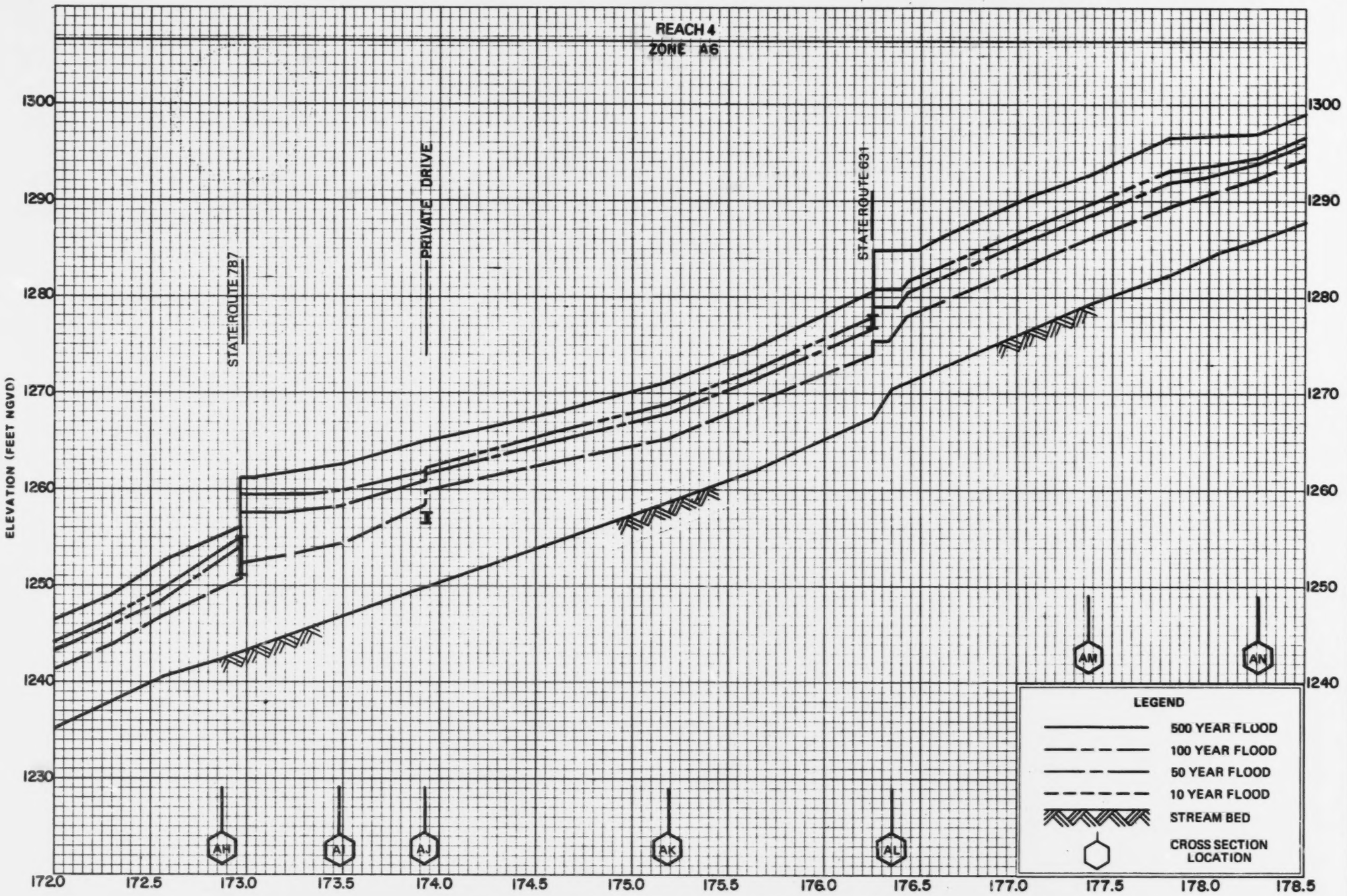
FLOOD PROFILES

SOUTH MAYO RIVER

03P

26

REACH 4
ZONE A6



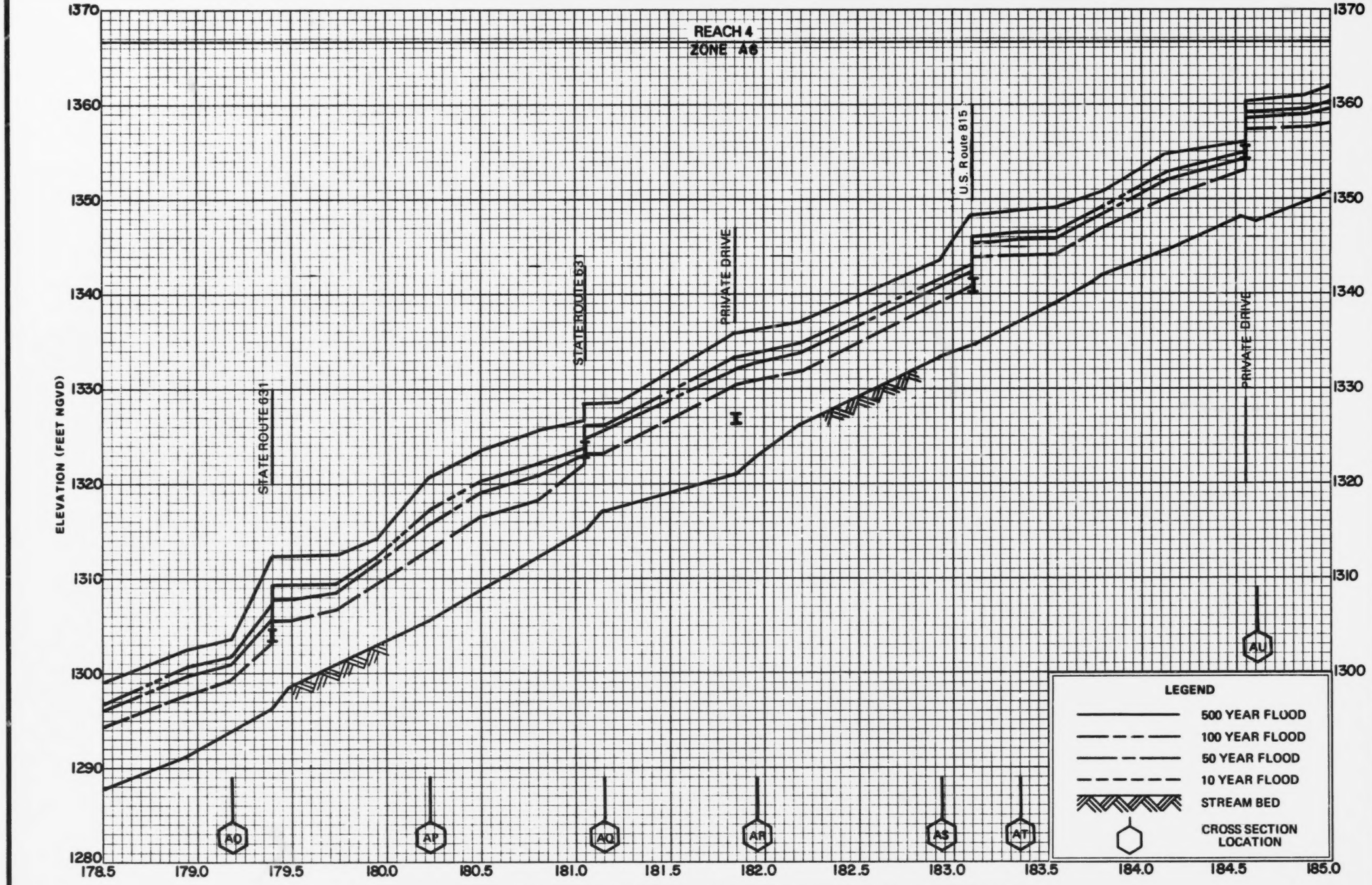
FLOOD PROFILES

SOUTH MAYO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY VA.
(UNINCORPORATED AREAS)

04P



FLOOD PROFILES

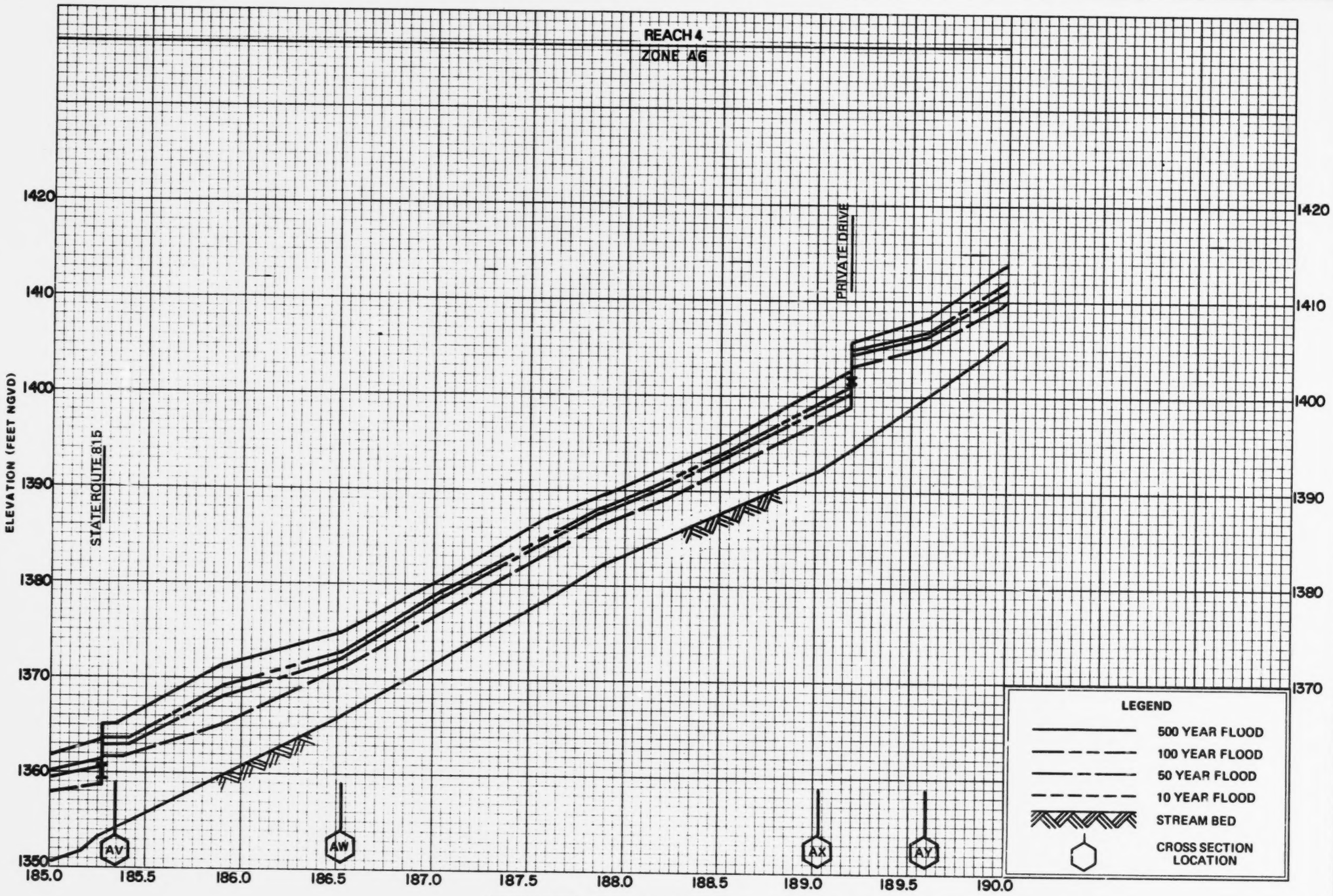
SOUTH MAYO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY VA.
(UNINCORPORATED AREAS)

05P

REACH 4
ZONE A6

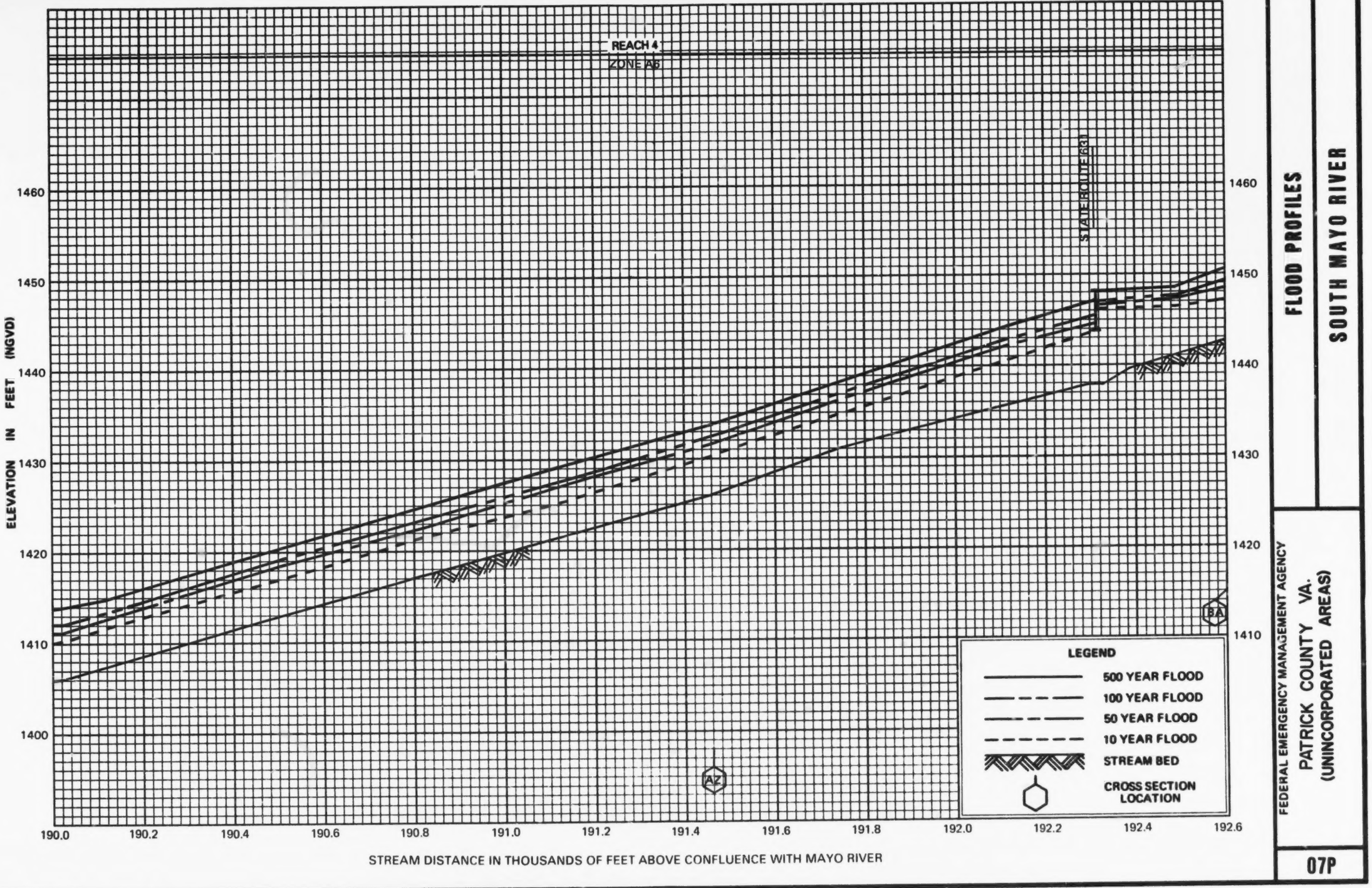


FLOOD PROFILES

SOUTH MAYO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
PATRICK COUNTY VA.
(UNINCORPORATED AREAS)

06 P



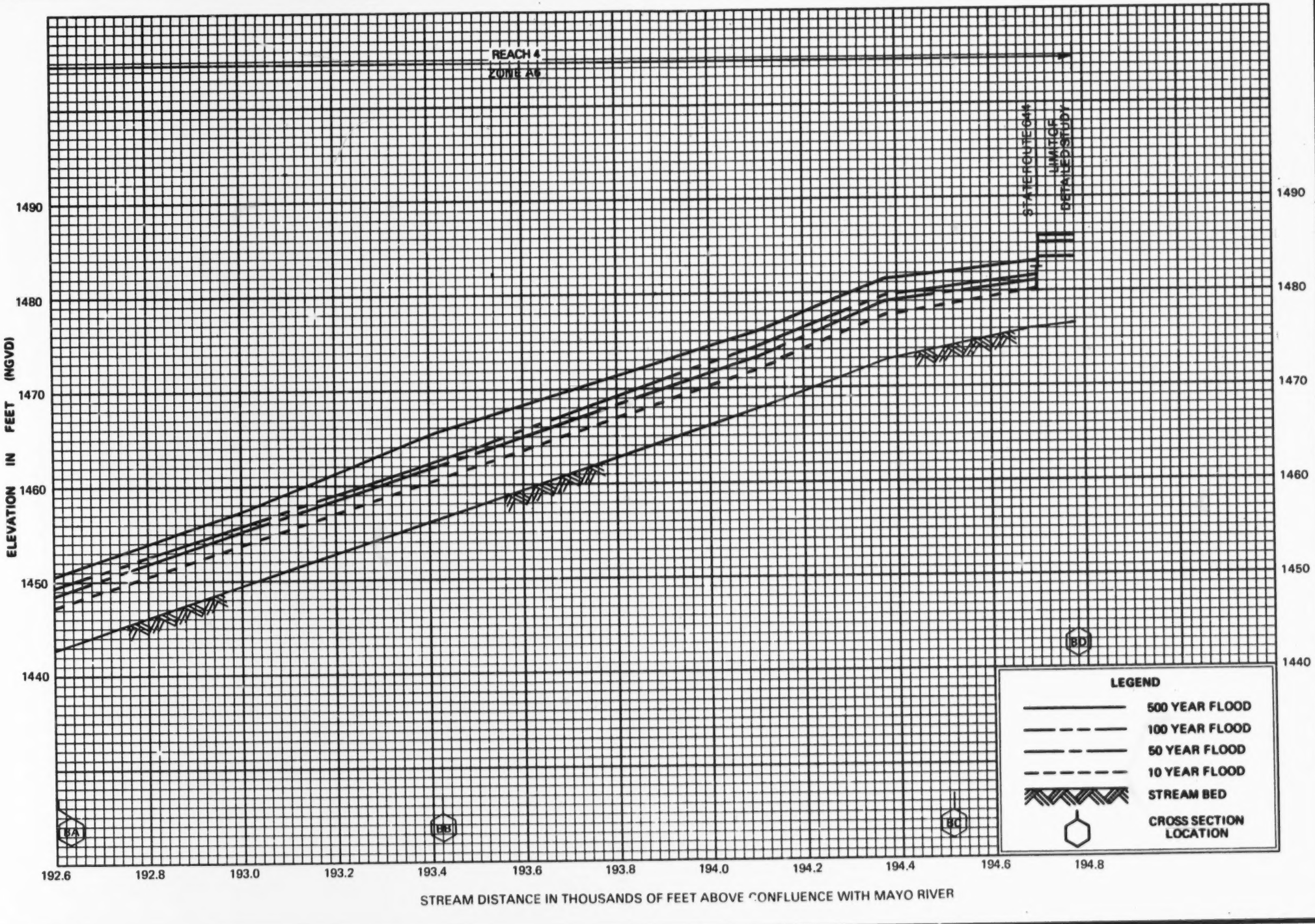
FLOOD PROFILES

SOUTH MAYO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY VA.
(UNINCORPORATED AREAS)

07P



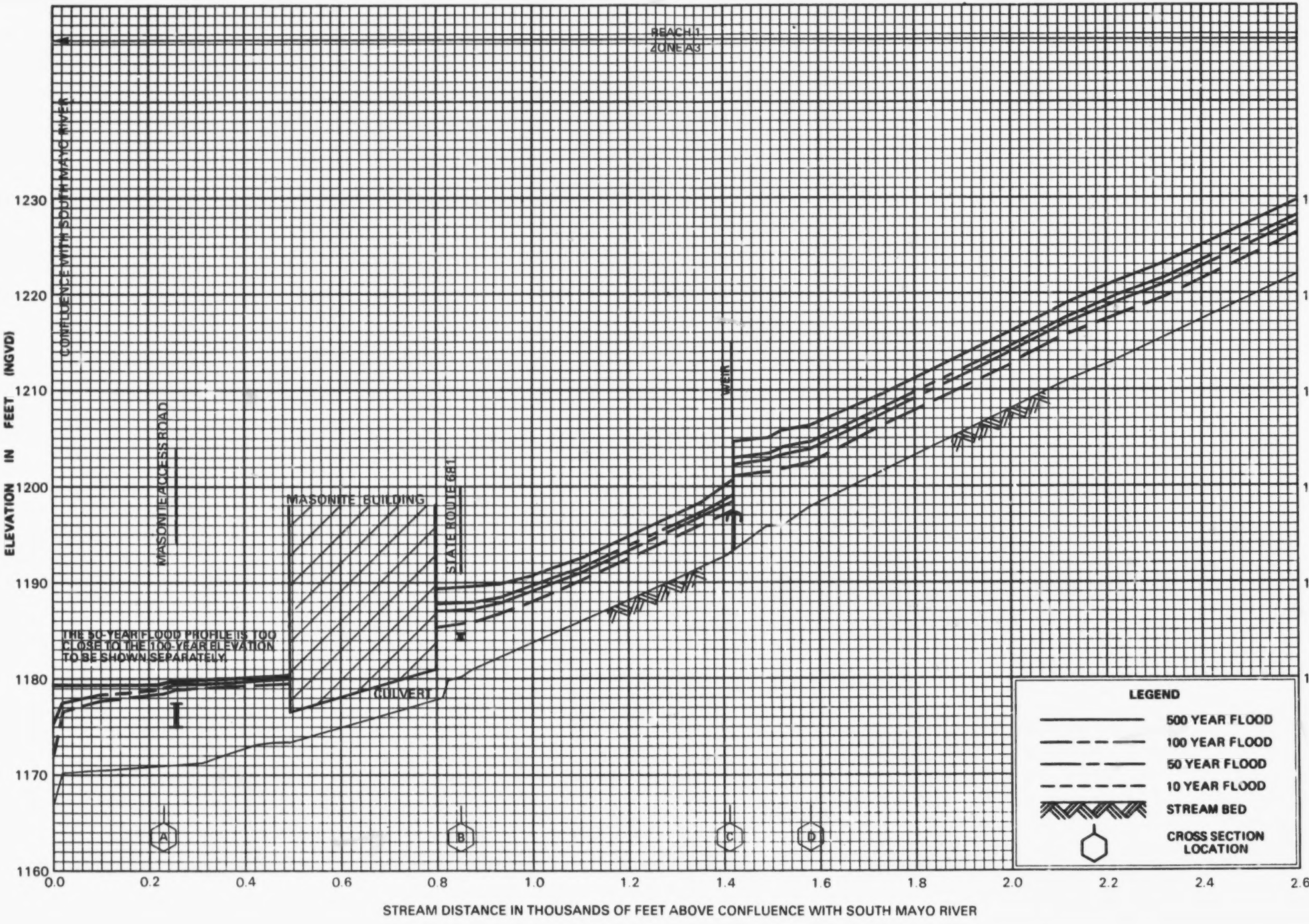
FLOOD PROFILES

SOUTH MAYO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY VA
(UNINCORPORATED AREAS)

08P



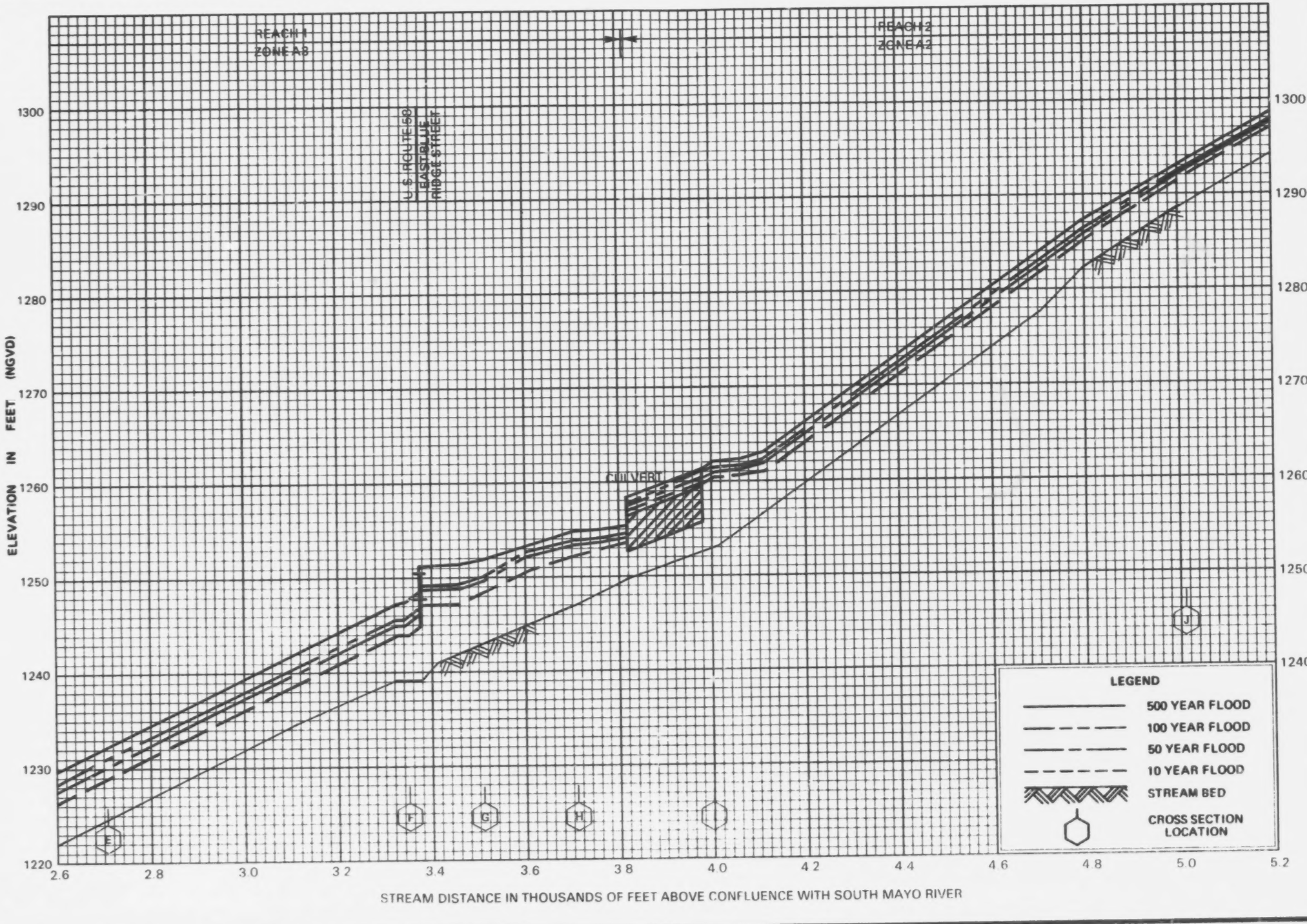
FLOOD PROFILES

CAMPBELL BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

09P



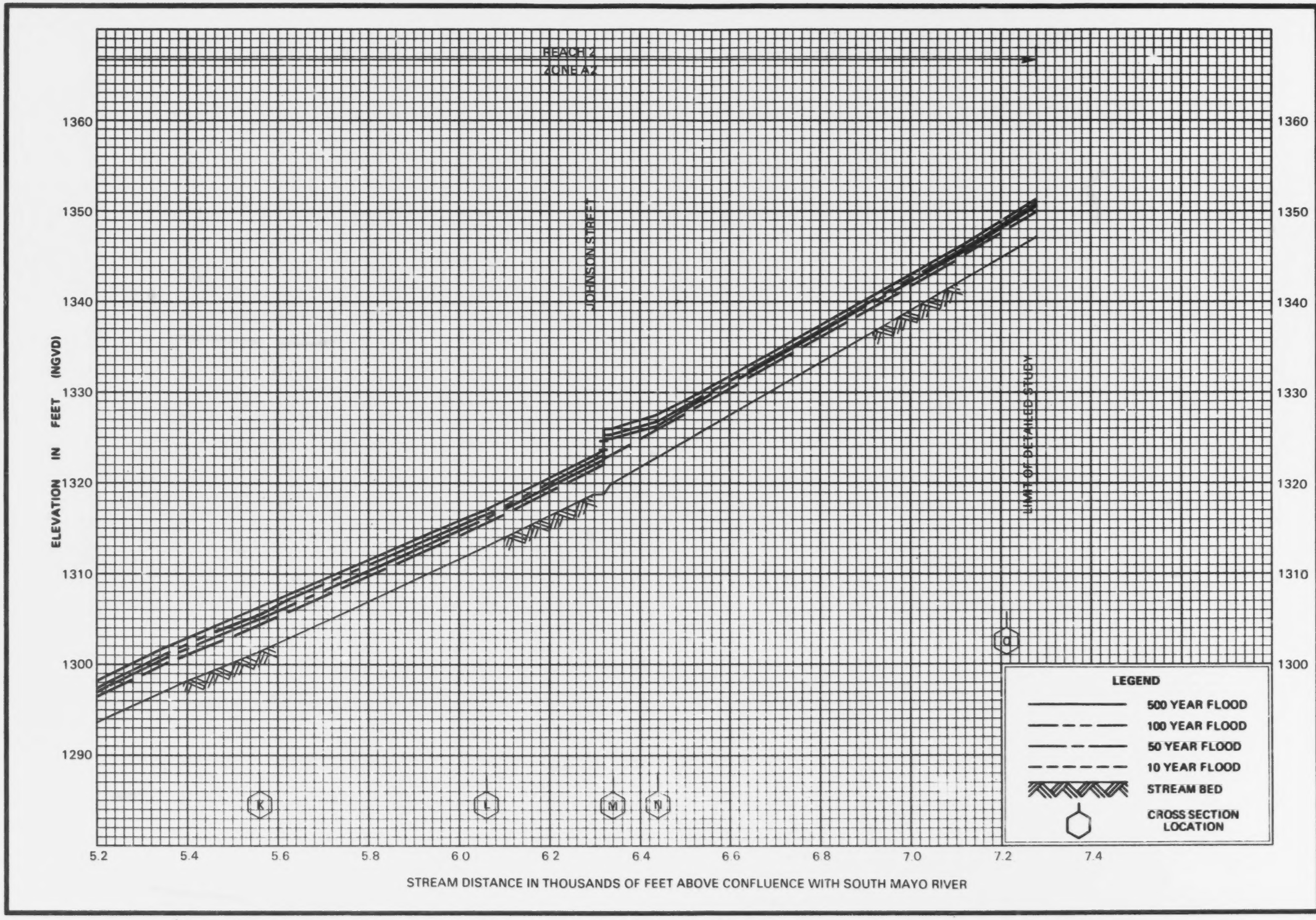
FLOOD PROFILES

CAMPBELL BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

10P



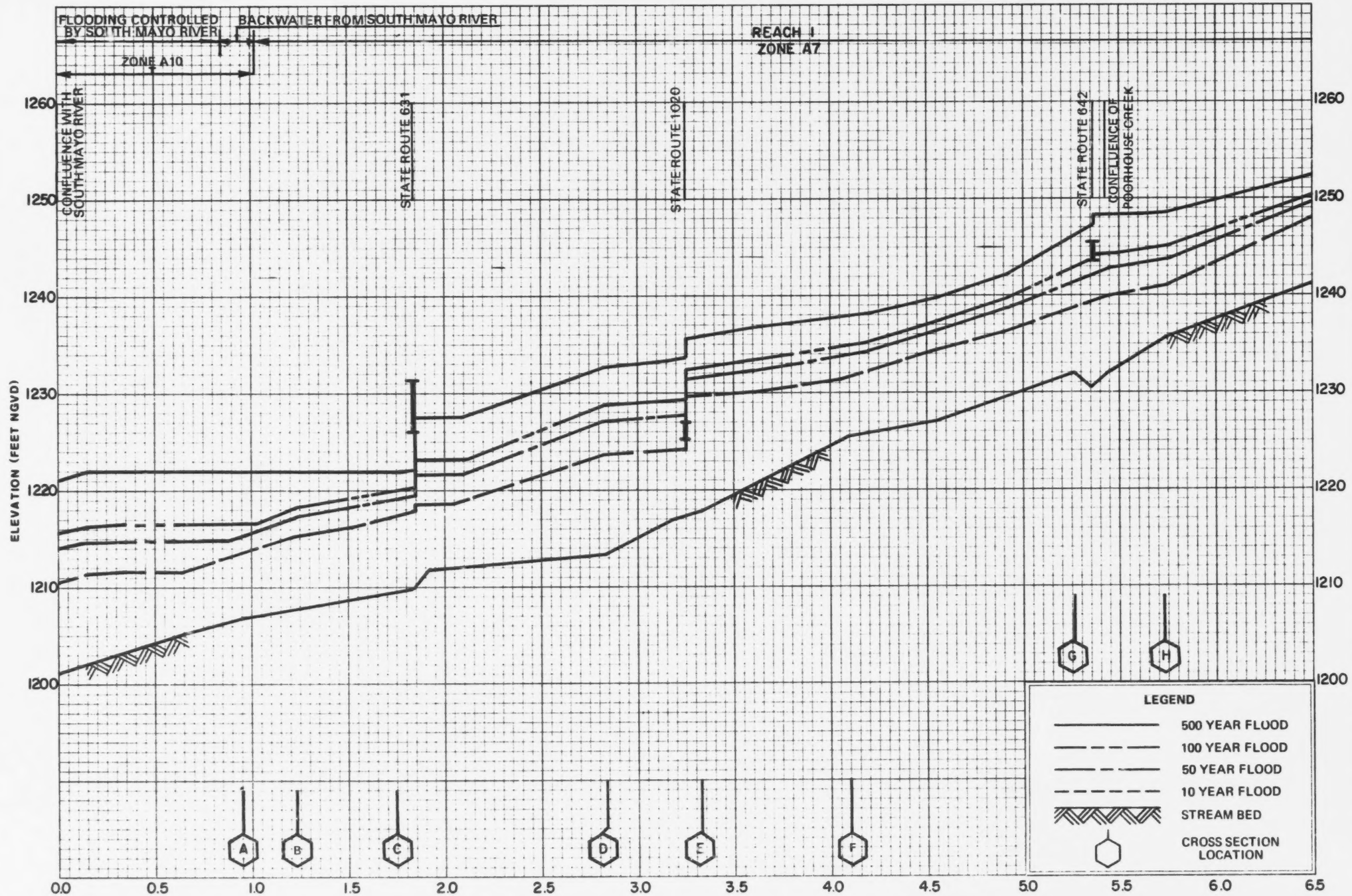
FLOOD PROFILES

CAMPBELL BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

11P



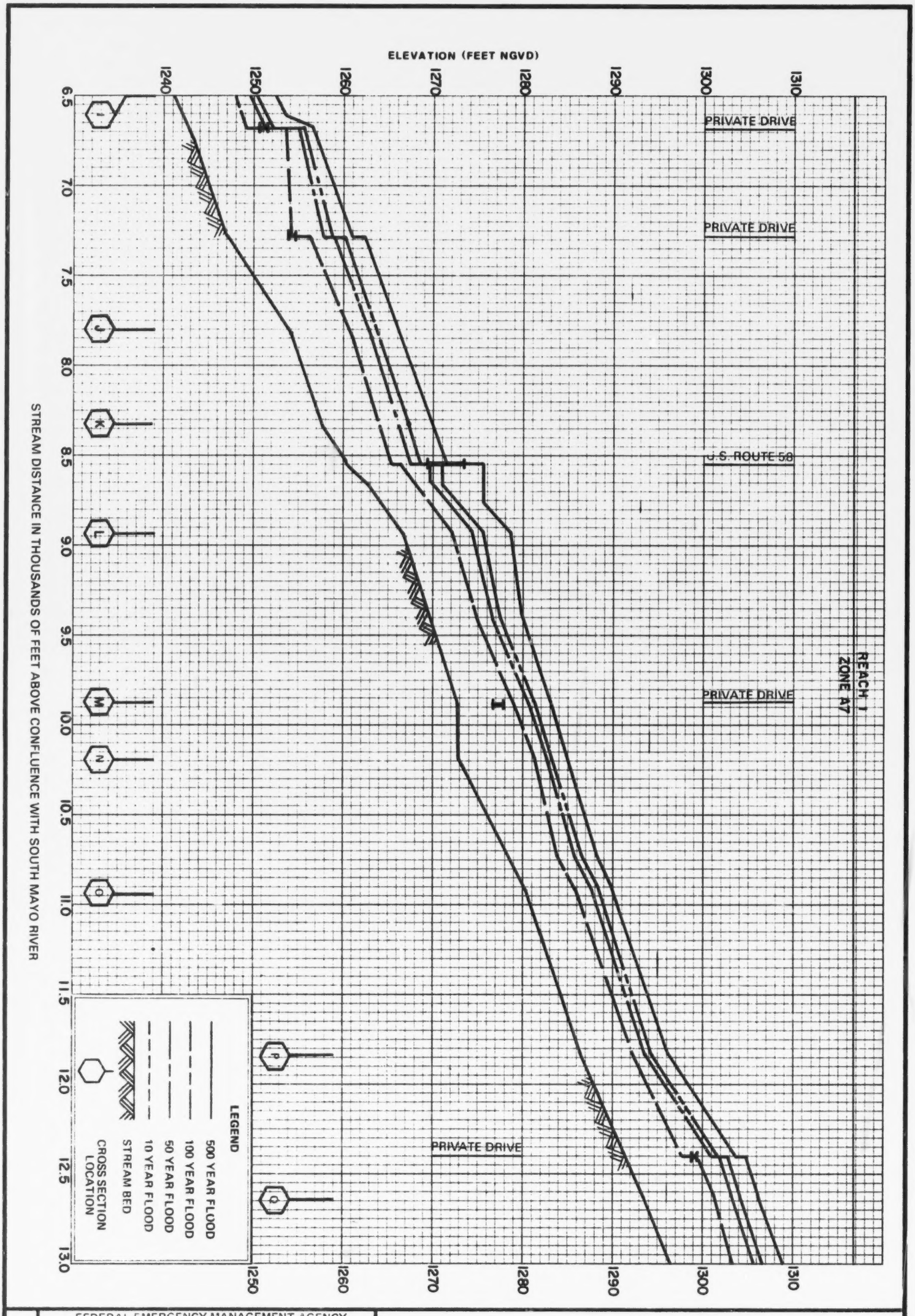
FLOOD PROFILES

NORTH FORK SOUTH MAYO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

12P



FEDERAL EMERGENCY MANAGEMENT AGENCY

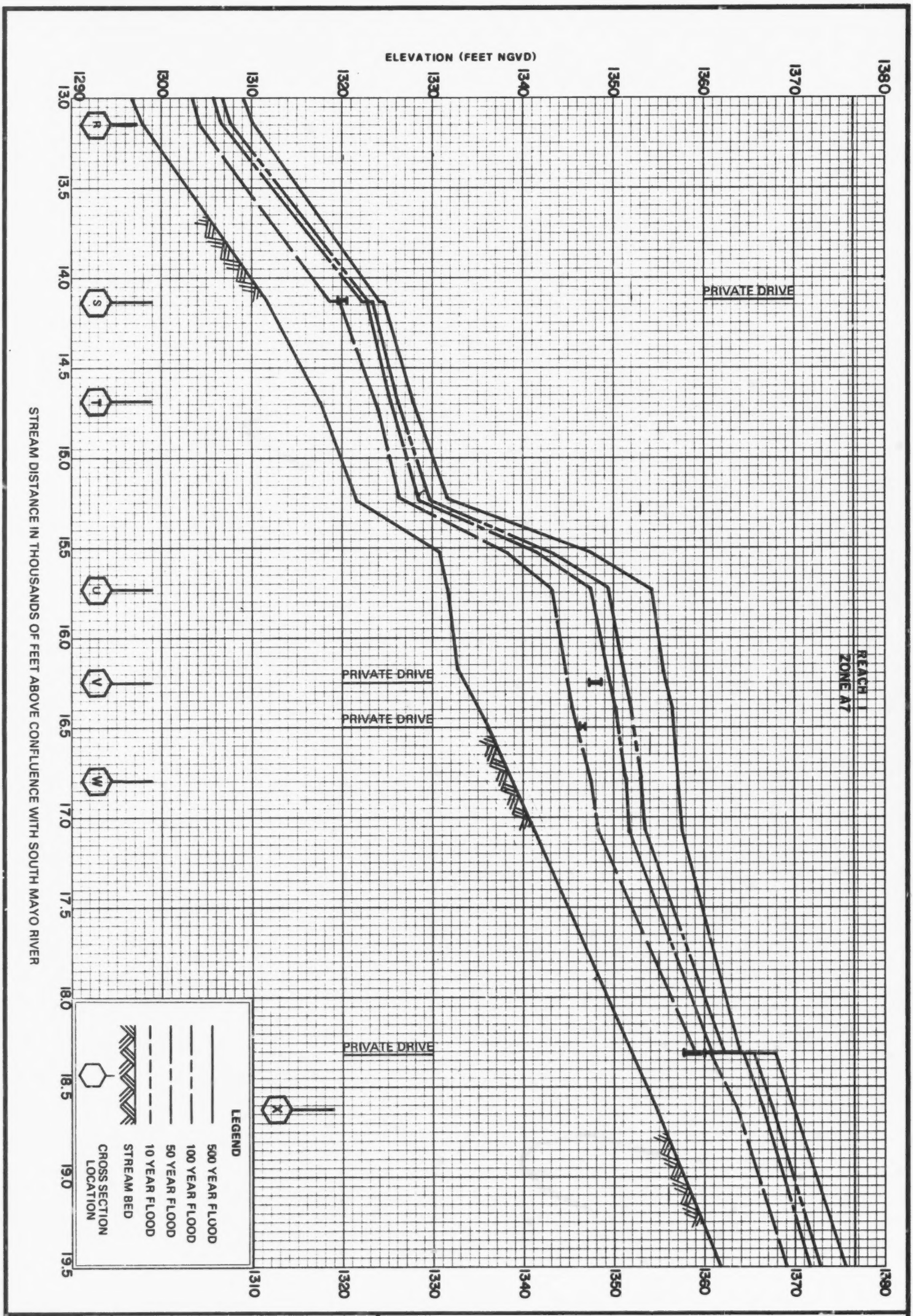
PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

FLOOD PROFILES

NORTH FORK SOUTH MAYO RIVER

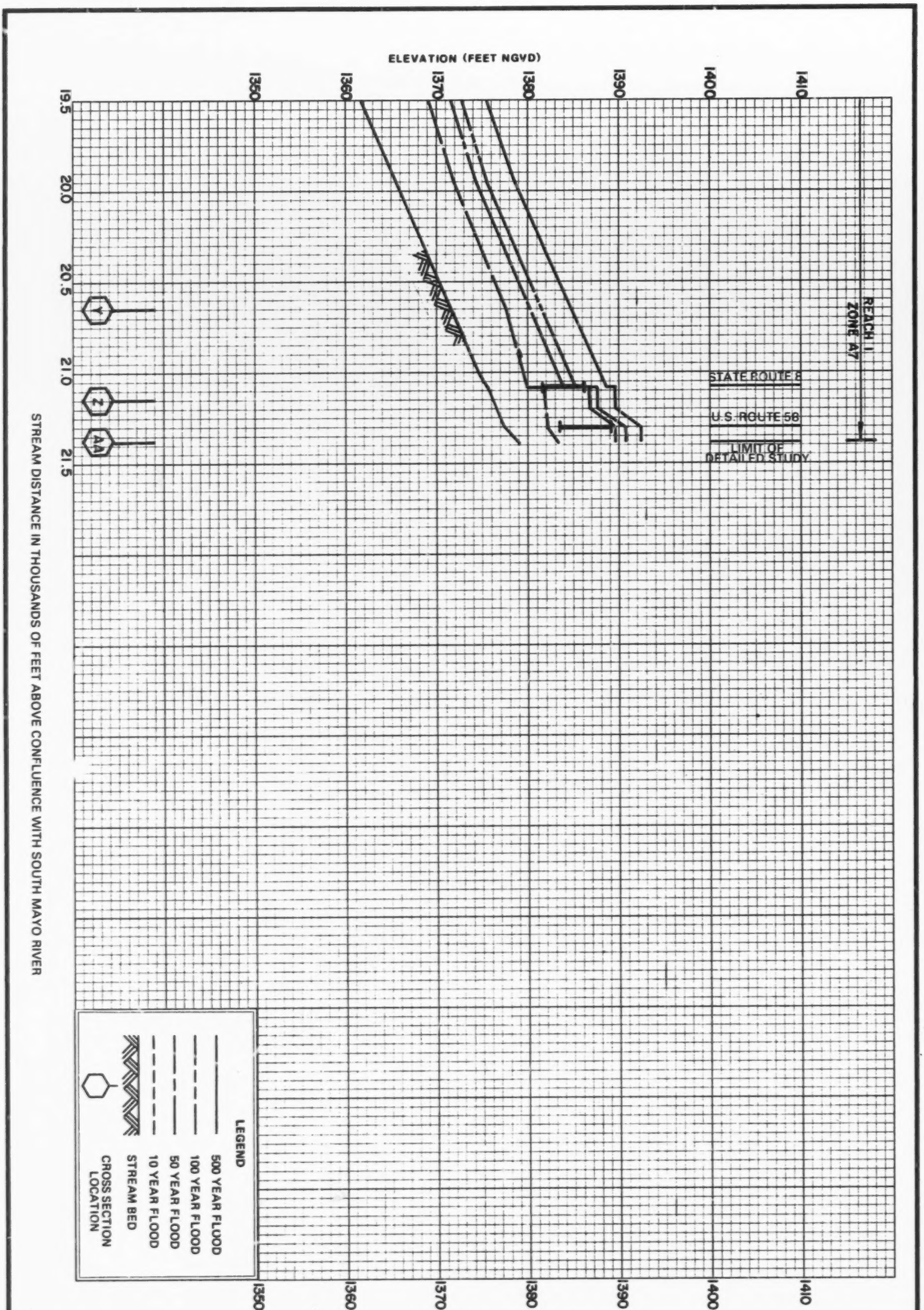
13P

36



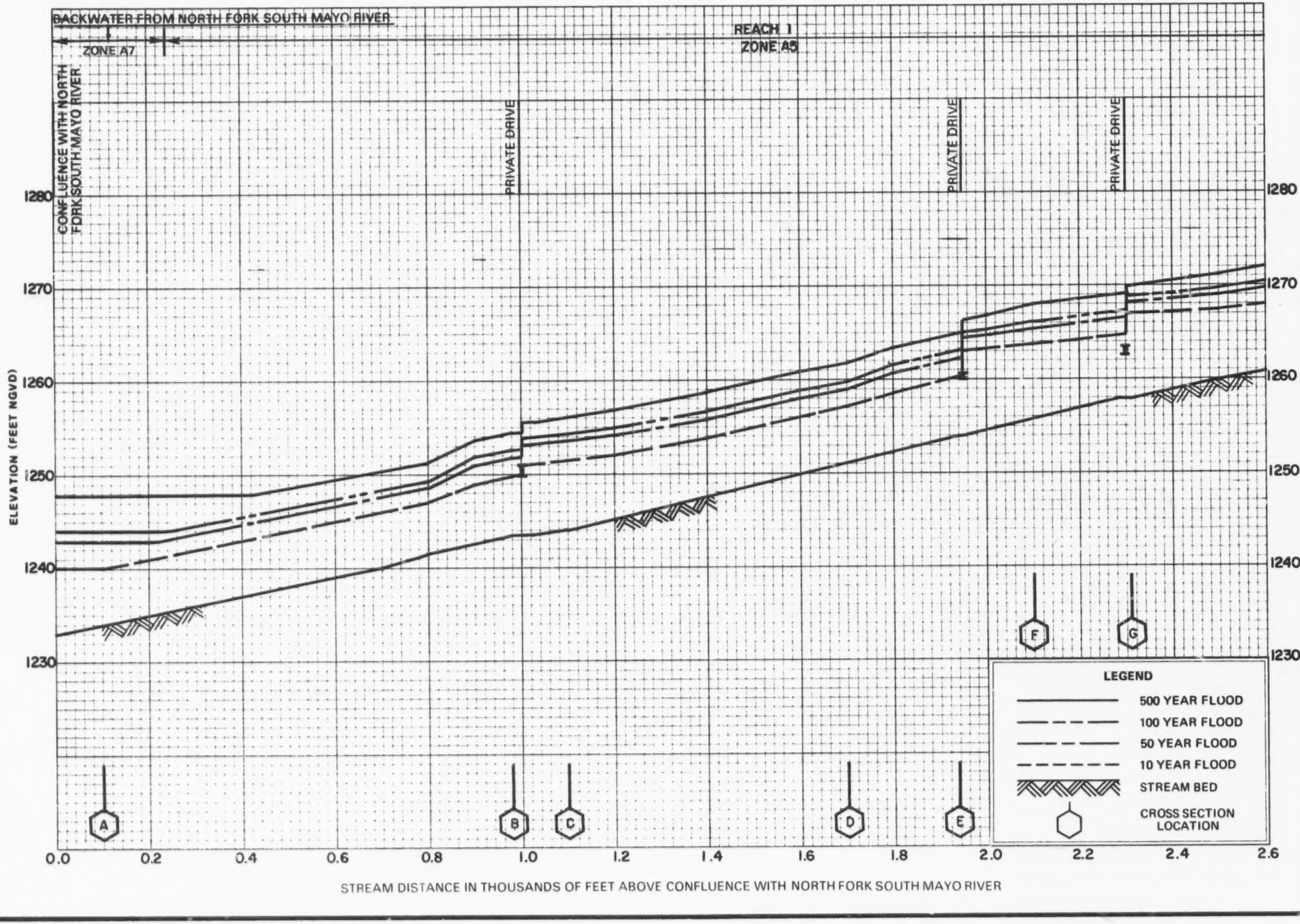
37

14 P	FEDERAL EMERGENCY MANAGEMENT AGENCY PATRICK COUNTY, VA (UNINCORPORATED AREAS)	**FLOOD PROFILES** NORTH FORK SOUTH MAYO RIVER



15P	FEDERAL EMERGENCY MANAGEMENT AGENCY PATRICK COUNTY, VA (UNINCORPORATED AREAS)	**FLOOD PROFILES** NORTH FORK SOUTH MAYO RIVER

AF 26144



FLOOD PROFILES

POORHOUSE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

16P

REACH 1
ZONE AE

PRIVATE DRIVE

ELEVATION (FEET NGVD)

1320
1310
1300
1290
1280
1270
1260
1250

H
I
J
K
L

2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0 4.2 4.4 4.6 4.8 5.0 5.2

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE CONFLUENCE WITH NORTH FORK SOUTH MAYO RIVER

LEGEND

- 500 YEAR FLOOD
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

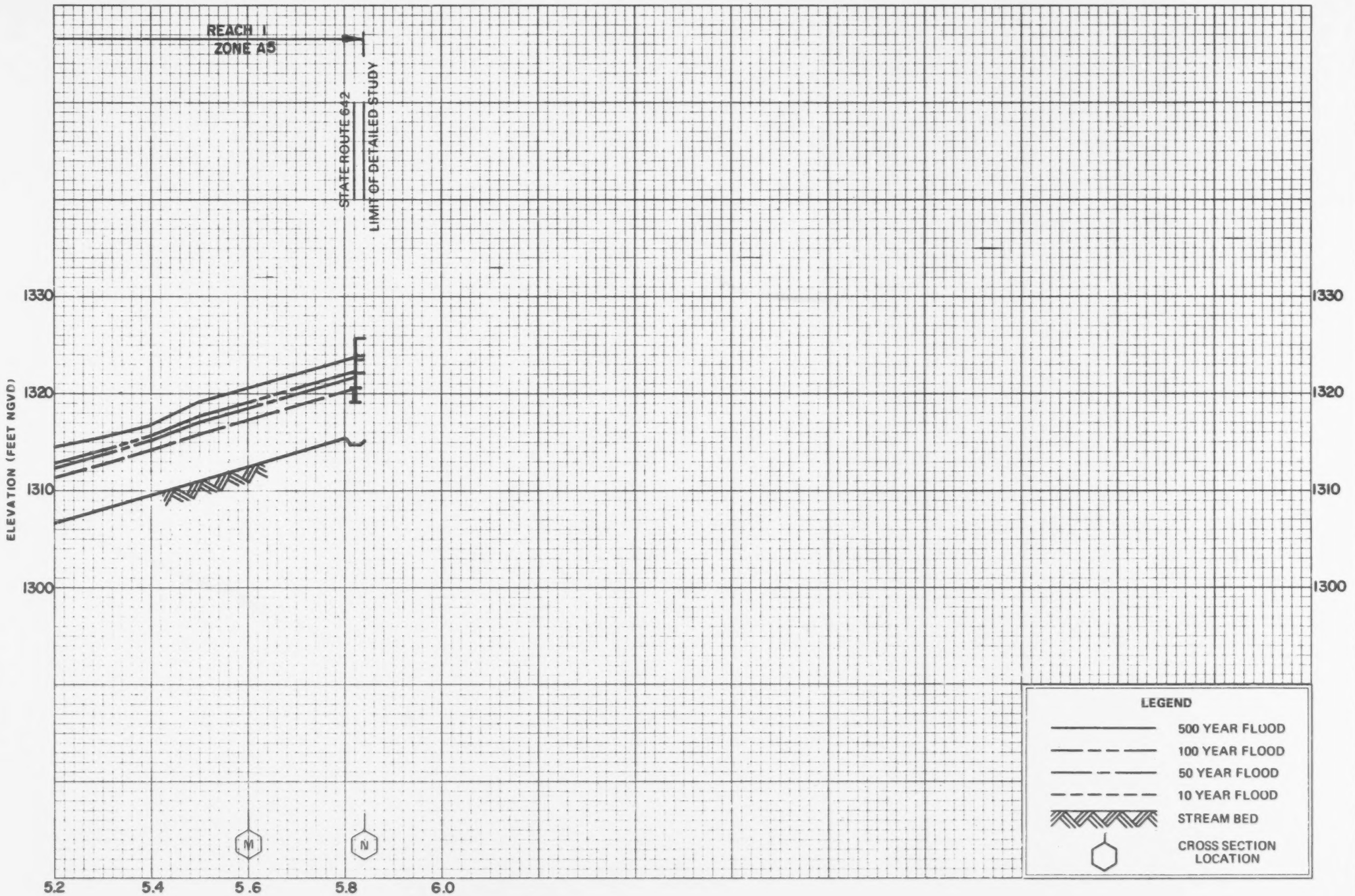
POORHOUSE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

17P

AF 26144



FLOOD PROFILES

POORHOUSE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

18P

REACH 1
ZONE A7

CONVERGENCE WITH SOUTH MAYO RIVER

DAM

DIVERGENCE FROM SOUTH MAYO RIVER

ELEVATION IN FEET (NGVD)

1190
1185
1180
1175
1170
1165
1160

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE CONVERGENCE WITH SOUTH MAYO RIVER

A B C D

LEGEND

- 500 - YEAR FLOOD
- 100 - YEAR FLOOD
- 50 - YEAR FLOOD
- 10 - YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

SOUTH MAYO RIVER DIVERSION

FEDERAL EMERGENCY MANAGEMENT AGENCY

PATRICK COUNTY, VA
(UNINCORPORATED AREAS)

19P